

Kansas State Fire Marshal – Fire Prevention Division

References (s): o6-IFC/Chpt 2; K.A.R 28-4-420

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FIRE FACT 071 – FIRE STOPPING

In building construction, a rated wall is designed to subdivide a building into separate fire areas in an effort to slow the spread of fire or smoke from one side of the building to the other. These walls are designed to maintain a specific fire rating in accordance with all applicable building codes.

There are various types of rated walls that are present in almost every building type. The International Building Codes provides the following definitions:

Fire Wall: A fire-resistance-rated wall having protected openings, which restricts the spread of fire and extends continuously from the foundation to or through the roof, with sufficient structural stability under fire conditions to allow collapse of construction on either side without collapse of the wall.

Fire Barrier: A fire-resistance-rated wall assembly of materials designed to restrict the spread of fire in which continuity is maintained.

Smoke Barrier: A continuous membrane, either vertical or horizontal, such as a wall, floor, ceiling assembly that is designed and constructed to resist the movement of smoke.

These rated walls are originally designed to be a continuous solid barrier. Additionally, a fire wall is specifically required to be continuous from exterior wall to exterior wall and begins at the foundation and extends to a distance above the roof. Rated walls are also required to be continuous through all concealed spaces unless the construction assembly forming the bottom of the space has a fire rating equal to that of the rated wall.

Over time, as building occupancy changes, technology advances, and buildings undergo renovation, there becomes a need for the facility to penetrate these rated walls with cables, piping, duct work, etc. These penetrations, any penetration, are required to be adequately firestopped in order to maintain the rating of the wall.

Firestopping: A precisely tested means and method for preventing the spread of fire (and to a lesser degree smoke) through a breach or gap in a fire-resistance rated wall.

The Kansas State Fire Marshal's Office highly recommends that facilities consult with a specialist or an engineer to obtain an engineering judgement and/or recommendation for a qualified contractor to perform the work. Firestopping should not be considered standard building maintenance.

The installation of firestopping materials is very technical and must be installed in accordance with the manufacturers' guidelines, otherwise the firestopping product will not be effective and the rated wall will not function as designed. Facilities must do extensive research into firestopping before attempting to correct any rated wall penetration. Listed below are the steps each facility must take in order to ensure proper firestopping.

1.) Choose a single firestopping manufacturer

Facilities should stick with the same firestopping manufacturer throughout an entire rated wall assembly. Firestopping manufacturers only pay for their products to be tested. Company A is not paying for their product to be tested along with Company B product. Ideally facilities should have the same firestopping manufacturer throughout the entire facility.

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2.) Establish a fire system assembly

A fire system assembly is similar to a pre-established product line. It's a group of firestopping materials that have been tested together for various penetration types and still maintain the rating. Once a facility chooses a fire system assembly they must stick with that assembly from that point forward for any new or inadequate penetrations.

3.) Read and understand the requirements

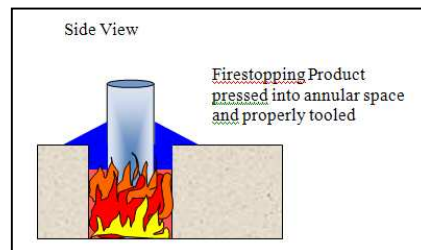
The fire system assembly contains the very specific installation instructions. Without the fire system assembly there is no way for a facility or contractor to know how the firestopping product is to be installed.

4.) Install according to manufacturer

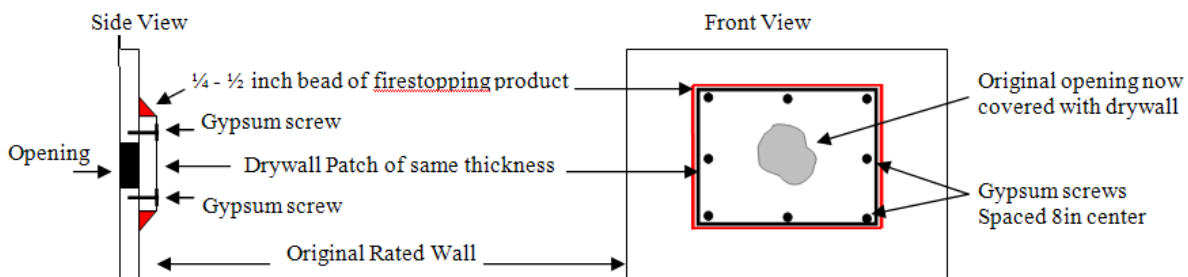
Firestopping is tested under very precise conditions. If the firestopping is not installed appropriately then it will not function as intended and the fire wall may not provide the separation necessary to allow occupants time to evacuate. Installation includes, but is not limited to: using the appropriate amount of product; the product is uniform and covers 360° around the penetrant; and the firestopping product is adequately tooled*.

Please review the following basic installation requirements:

Tooling: the final step in firestopping which insures an appropriate amount of product is pushed down and into the annular space and that the product adheres to both the penetrating item and the wall/floor surface.



Rated Wall Band-Aids: the method of overlaying a piece of drywall to the original drywall rated wall in order to cover a large hole or to reduce the annular space around a penetration for firestopping purposes.



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The Kansas State Fire Marshal's Office will continue to cite any facility whose current firestopping installation looks inadequate. If a facility is cited for an inadequate existing or new penetration, they must submit documentation regarding the firestopping product and the fire system assembly. For existing inadequate penetrations, facilities must completely remove the old product and start over.

Example of Fire System Assembly:

System No.
F Rating — 2 Hr
T Ratings — 0, 1-1/4 and 2 Hr (See Item 2)
L Rating At Ambient — Less Than 1 CFM/sq ft
L Rating At 400 F — 4 CFM/sq ft

1. Floor or Wall Assembly — Min 4-1/2 in. (114 mm) thick reinforced lightweight or normal weight (100-150 pcf or 1600-2400 kg/m³) concrete floor or min 5 in. (127 mm) thick reinforced lightweight or normal weight (100-150 pcf or 1600-2400 kg/m³) concrete wall. Wall may also be constructed of any UL Classified Concrete Blocks*. Floor may also be constructed of any 6 in. thick UL Classified hollow core Precast Concrete Units. Max diam of opening is 4 in. (102 mm).
See Concrete Blocks (CAZT) and Precast Concrete Units* (CFTV) categories in the Fire Resistance Directory for names of manufacturers.

2. Steel Sleeve — (Optional) Nom 4 in. (102 mm) diam (or smaller) Schedule 40 (or heavier) steel pipe cast or grouted into floor or wall assembly, flush with floor or wall surfaces or extend a max 3 in. (76 mm) above the floor or beyond both surfaces of the wall. The T Rating for the firestop system is 2 hr except that when the steel sleeve is provided. If the steel sleeve is installed flush with both surfaces of the floor or wall, the T Rating of the firestop system is 1-1/4 hr. If the steel sleeve extends beyond the top surface of the floor or both surfaces of the wall, the T Rating of the firestop system is 0 hr.

3. Through Penetrants — One nonmetallic pipe to be installed either concentrically or eccentrically within the firestop system. The annular space between pipe and sleeve (Item 2) shall be min 1/4 in. (6 mm) to max 1-3/8 in. (35 mm). When steel sleeve (Item 2) is not provided, the annular space between pipe and periphery of opening shall be min 0 in. (point contact) to max 1-5/8 in. (41 mm). Pipe to be rigidly supported on both sides of floor or wall assembly. The following types and sizes of nonmetallic pipes may be used:

- A. Polyvinyl Chloride (PVC) Pipe — Nom. 2 in. (51 mm) diam (or smaller) Schedule 40 solid-core or cellular core PVC pipe for use in closed (process or supply) or vented (drain, waste or vent) piping system.
- B. Chlorinated Polyvinyl Chloride (CPVC) Pipe — Nom 2 in. (51 mm) diam (or smaller) SDR17 CPVC pipe for use in closed (process or supply) or vented (drain, waste or vent) piping systems.
- C. Rigid Nonmetallic Conduit — Nom 2 in. (51 mm) diam (or smaller) Schedule 40 PVC conduit installed in accordance with Article 347 of the National Electrical Code (NFPA 70).
- D. Crosslinked Polyethylene (PEX) Tubing — Nom 2 in. (51 mm) diam (or smaller) SDR 9 PEX tubing for use in closed (process or supply) piping systems.

4. Firestop System — The firestop system shall consist of the following:

- A. Packing Material — Min 4 in. (102 mm) thickness of min 4 pcf (64 kg/m³) mineral wool batt insulation firmly packed into opening as a permanent form. Packing material to be recessed from top surface of floor or both surfaces of wall to accommodate the required thickness of fill material. When precast concrete units are used, packing material to be recessed from top surface of floor to accommodate the required thickness of fill material and to be installed flush with bottom surface of floor.
- B. Fill, Void or Cavity Material* — Sealant — Min 1/2 in. (13 mm) thickness of fill material applied within the annulus, flush with top surface of floor or both surfaces of wall assembly. Additionally, nom 1/2 in. (13 mm) bead of fill material applied between concrete and penetrant interface.